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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,227	02/26/2002	Hisae Yoshizawa	112046	2635

25944 7590 11/28/2003

OLIFF & BERRIDGE, PLC
P.O. BOX 19928
ALEXANDRIA, VA 22320

EXAMINER

LISH, PETER J

ART UNIT	PAPER NUMBER
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1754

DATE MAILED: 11/28/2003

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/082,227		YOSHIZAWA ET AL.	
	Examiner		Art Unit	
	Peter J Lish		1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16 and 19-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16 and 19-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Applicant's arguments with respect to claims 16 and 19-23 have been considered but are moot in view of the new ground(s) of rejection. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102/103

Claims 16, 19-21, and 23 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kunio et al. (JP 07-048111).

Kunio discloses a process for the treatment of multi-walled carbon nanotubes wherein the nanotubes are subjected to a mechanochemical treatment, such as either dry or wet pulverization, followed by a baking of the resultant product at between about 500 and 800 °C. It is additionally taught to treat the pulverized nanotubes with acid, such as nitric acid (see example 1).

It is not explicitly taught that the process results in modified graphene sheets, such as those containing amorphous carbon, or that the process results in the formation of nodes, however, it is expected that this be the case, as no difference is seen between the process of Kunio et al. and that of the instantly claimed invention. Where, as here, the reference discloses all the limitations of a claim except a property or function, and the examiner cannot determine whether or not the reference inherently possesses properties which anticipate or render obvious the claimed invention, the burden of proof is shifted to the applicant, as in *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980).

Art Unit: 1754

Claims 16, 19-21, and 23 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ago et al. ("Work Functions and Surface...").

Ago discloses a process for the treatment of multi-walled carbon nanotubes wherein the nanotubes are subjected first to repeated sonication, centrifugation, and filtration processes (i) and are then subjected to oxygen plasma treatment (ii), which is known to take place under extreme temperatures and is therefore determined to be encompassed under the general term "heating treatment". The purification process, specifically the sonication, described by (i) is determined to be a mechanochemical treatment as it uses an external force to form defect sites (page 8120, paragraph 1). The combination of the processes results in the transformation of graphene sheets to amorphous carbon. It is expected that this functional layer contain at least two layers of modified graphene sheets (Figure 4).

It is not explicitly taught that the process results in the formation of nodes, however, it is expected that this be the case, as no difference is seen between the process of Ago et al. and that of the instantly claimed invention. Where, as here, the reference discloses all the limitations of a claim except a property or function, and the examiner cannot determine whether or not the reference inherently possesses properties which anticipate or render obvious the claimed invention, the burden of proof is shifted to the applicant, as in *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980).

Claims 16, 19-21, and 23 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Zhou (US 2002/0193040 A1).

Art Unit: 1754

Zhou teaches a process for the treatment of multi-walled nanotubes comprising the dispersion of the nanotubes in a suitable liquid medium, such as an organic solvent, by a high powered ultrasonic horn, followed by oxidation with a solution containing a strong acid. Zhou also teaches a process for the treatment of multi-walled nanotubes comprising cutting the nanotubes by milling and then treating the cut nanotubes at high temperature in the presence of intercalates, such as a variety of metals, Lewis acids, halogen mixtures, acidic oxides, and strong acids. Additionally, Zhou teaches a process for the treatment of multi-walled nanotubes comprising ion bombardment of the nanotubes to create defects followed by sonication in acid.

It is not explicitly taught that the process results in modified graphene sheets, such as those containing amorphous carbon, or that the process results in the formation of nodes, however, it is expected that this be the case, as no difference is seen between the process of Zhou and that of the instantly claimed invention. Where, as here, the reference discloses all the limitations of a claim except a property or function, and the examiner cannot determine whether or not the reference inherently possesses properties which anticipate or render obvious the claimed invention, the burden of proof is shifted to the applicant, as in *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980).

Claim Rejections - 35 USC § 103

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ago as applied to claim 16 above, and further in view of Niu et al. (US 2003/0039604 A1).

Ago et al. is applied above. Ago et al. does not explicitly teach the formation of a structure through adhering the oxidized multi-walled nanotubes to each other. Niu et al.,

Art Unit: 1754

however, teach that carbon nanotubes become self-adhering after oxidation. Very hard, dense mats are formed by highly dispersing the oxidized nanotubes filtering, and drying (paragraph 0117). It therefore would have been obvious to one of ordinary skill at the time of invention to use the oxidized nanotubes of Ago et al. in the process of Niu et al., in order to form these rigid, porous structures.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Lish whose telephone number is 703-308-1772 until December 11th and 571-272-1354 thereafter. The examiner can normally be reached on 9:00-6:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached at 703-308-3837 until December 11th and 571-272-1358 thereafter. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



PL

STUART L. HENDRICKSON
PRIMARY EXAMINER